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AF/2871  
#FFW

Attorney's Docket No. 64,600-079

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Hong-Da Liu

Group Art Unit: 2871

Serial No.: 10/ 032,523

Examiner: Hoan C. Nguyen

Filed: Oct. 19, 2001

For: Liquid Crystal on Silicon Incorporating Integrated Spacers and Silicon Light Valves and Method for Fabrication

Commissioner for Patents  
Alexandria, VA 22313

TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION-37 CFR 192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on April 15, 2004.

NOTE: "The Appellant shall, within 2 months from the date of the notice of appeal under §1.191(a) or within the time allowed for response to the action appealed from, if such time is later, file a brief in "triplicate", 37 C.F.R. 1.192(a) [emphasis added].

2. STATUS OF APPLICANT

This application is on behalf of:

- ☒ other than a small entity.  
☐ a small entity.

A verified statement:

- ☐ is attached.  
☐ was already filed.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 1.17(f), the fee for filing the Appeal Brief is:

- ☐ small entity \$165.00  
☒ other than a small entity \$330.00

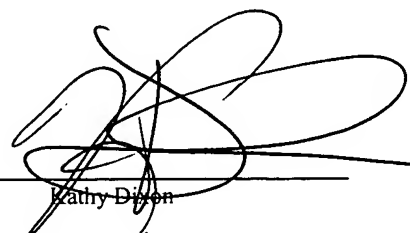
Appeal Brief fee due: \$ 330.00

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for Patents, Alexandria, VA 22313

  
Kathy Dillon

Dated: June 15, 2004

4. EXTENSION OF TERM

NOTE: The time periods set forth in 37 CFR 1.192(a) are subject to the provision of ☐ 1.136 for patent applications. 37 CFR 1.191(d). See also Notice of November 5, 1985 (1060 O.G. 27).

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply:

(complete (a) or (b), as applicable)

- (a) ☐ Applicant petitions for an extension of time under 37 CFR 1.136  
(fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

	Extension (months)	Fee for other than <u>small entity</u>	Fee for <u>small entity</u>
<input type="checkbox"/>	one month	\$ 110.00	\$ 55.00
<input type="checkbox"/>	two months	\$ 420.00	\$210.00
<input type="checkbox"/>	three months	\$ 950.00	\$475.00
<input type="checkbox"/>	four months	\$1,480.00	\$740.00

Fee: \$ \_\_\_\_\_

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

- ☐ An extension for \_\_\_\_\_ months has already been secured, and the fee paid therefor of \$ \_\_\_\_\_ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request: \$ \_\_\_\_\_

or

- (b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

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Appeal Brief Fee: \$ 330.00  
Extension fee (if any) \$ \_\_\_\_\_

TOTAL FEE DUE: \$ 330.00

6. FEE PAYMENT

X Attached is a Credit Card Payment Form for the sum of \$ 330.00

A duplicate copy of this transmittal is attached.

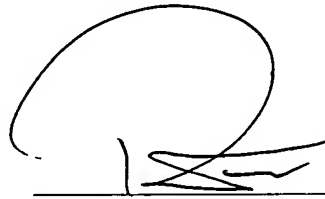
7. FEE DEFICIENCY

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, 1065 O.G. 31-33.

  X   If any additional extension and/or fee is required, this is a request therefor  
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And/Or

  X   If any additional fee for claims is required, please charge Visa Credit Card  
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A handwritten signature in black ink, appearing to be 'Randy W. Tung', written over a horizontal line.

Signature of Attorney

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Hong-Da Liu

Serial No.: 10/ 032,523

Filed: Oct. 19, 2001

Group Art Unit: 2871

Examiner: Hoan C. Nguyen

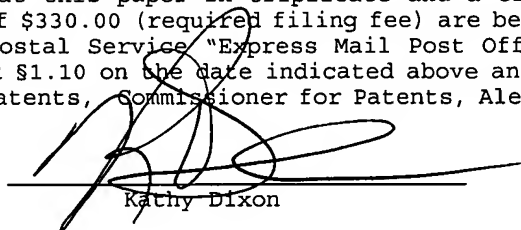
For: Liquid Crystal on Silicon Incorporating Integrated  
Spacers and Silicon Light Valves and Method for Fabrication

Attorney Docket No.: 64,600-079

**EXPRESS MAIL CERTIFICATE**

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I hereby certify that this paper in triplicate and a credit card payment form in the amount of \$330.00 (required filing fee) are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to: Box Appeal Brief - Patents, Commissioner for Patents, Alexandria, VA 22313-1450.

  
Kathy Dixon

**APPEAL BRIEF**

Commissioner for Patents  
Alexandria, VA 22313-1450

Sir:

Appellants appeal in the captioned application from the Examiner's final rejection, dated January 15, 2004, of claims 1, 3-14 and 16-20, under 35 USC §103(a) as being unpatentable over Saito et al '308, Lu et al '786, Kim et al '794, Iwaki et al '432, Bischel et al '268, Rosenblatt et al 358 and Akimoto et al JP '522, Nishio et al '547.

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It is urged that the rejection be reversed and that all the claims be allowed.

(1) REAL PARTY IN INTEREST

The real party in interest in the present appeal is the recorded Assignee of Industrial Technology Research Institute.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that are known to the Appellant, the Appellant's legal representative, or the assignee.

(3) STATUS OF CLAIMS

Claims 1, 3-14 and 16-20 are pending in the application.

Claims 1, 3-14 and 16-20 stand rejected.

(4) STATUS OF AMENDMENTS

A Request For Reconsideration was filed on or about March 25, 2004.

An Advisory Action mailed April 5, 2004 by the Examiner which maintained the rejection of all claims.

A Notice of Appeal was filed on or about April 15, 2004.

(5) SUMMARY OF THE INVENTION

The invention generally relates to a liquid crystal on silicon structure and a method for fabrication and more particularly, relates to a liquid crystal on silicon structure that incorporates integrated spacers and silicon light valves and a method for fabricating such structure.

(Specification, page 1, paragraph 001.)

In a preferred embodiment, a liquid crystal on silicon structure incorporating integrated spacers and silicon light valves is provided which includes a silicon substrate that has a first multiplicity of pixel electrodes formed on a top surface; a second multiplicity of integrated spacers formed of an insulating material on the top surface of the silicon substrate in-between the first multiplicity of pixel electrodes; a third multiplicity of silicon light valves formed on the top surface of the silicon substrate for orienting liquid crystal molecules; a glass substrate that is optically transparent and has an optically transparent electrode layer coated on a bottom surface positioned juxtaposed to and over the silicon substrate supported by the second multiplicity of

integrated spacers to form a sealed cavity by engaging a perimeter seal surrounding the two substrates, the sealed cavity encases the optically transparent electrode layer and the third multiplicity of silicon light valves therein; and a liquid crystal material filling the sealed cavity.

(Specification, page 9, paragraph 0019)

The present invention is further directed to a method for fabricating a liquid crystal on silicon structure with built-in integrated spacers and silicon light valves which can be carried out by the operating steps of providing a silicon substrate that has a top surface; forming a first multiplicity of pixel electrodes on the top surface; forming a second multiplicity of integrated spacers from an insulating material on the top surface of the silicon substrate in-between the first multiplicity of pixel electrodes; forming a third multiplicity of silicon light valves on the top surface of the silicon substrate for orienting liquid crystal molecules; providing a glass substrate that is optically transparent and coating an optically transparent electrode layer on a bottom surface of the glass substrate; positioning the glass substrate juxtaposed to and over the silicon substrate supported by the second multiplicity of integrated spacers and sealing a

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perimeter of the two substrates to form a sealed cavity therein between; and filling the sealed cavity through an inlet with a liquid crystal material.

(Specification, page 11, paragraph 0022)

(6) ISSUES

**Issue I**

Is the rejection of claims 1, 3, 10, 12, 14 and 16 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue II**

Is the rejection of claims 4 and 17 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Kim et al '794 proper when such references does not teach or suggest the specifically claimed limitations in the present application?



**Issue III**

Is the rejection of claim 5 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Iwaki et al '432 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue IV**

Is the rejection of claim 6 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Bischel et al '268 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue V**

Is the rejection of claim 7 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Rosenblatt et al '358 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue VI**

Is the rejection of claims 8 and 18 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Akimoto et al JP '522 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue VII**

Is the rejection of claims 9, 11 and 19-20 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

**Issue VIII**

Is the rejection of claims 13 under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Nishio et al '547 proper when such references does not teach or suggest the specifically claimed limitations in the present application?

(7) GROUPING OF CLAIMS

The rejection of claims 1, 3, 10, 12, 14 and 16 are contested as a group.

The rejection of claims 4 and 17 are contested as a separate group.

The rejection of claim 5 is contested as a separate group.

The rejection of claim 6 is contested as a further separate group.

The rejection of claim 7 is contested as yet a further separate group.

The rejection of claims 8 and 18 are contested as a separate group.

The rejection of claims 9, 11 and 19-20 are contested as a separate group.

The rejection of claim 13 is contested as a separate group.

The claims in each respective group stand or fall together.

(8) ARGUMENTS

**Issue I**

Claims 1, 3, 10, 12, 14 and 16 are rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786.

The rejection of claims 1, 3, 10, 12, 14 and 16 under 35 USC §103(a) based on Saito et al and Lu et al is improper and must be reversed.

While Appellants concede that Lu et al teaches a liquid crystal comprising a multiplicity of multi-domain homeotropically aligned liquid crystal cells, Appellants respectfully submit that there can be no motivation to combine the teachings of Lu et al with Saito et al, since Saito et al does not contain any teaching that multi-domain homeotropically aligned liquid crystal cells are preferred in their liquid crystal display device. As a matter of fact, Saito et al discloses a liquid crystal display device that is equipped with an optical shield film. The novelty of the Saito et al device resides in the use of an additional optical shield film, and not in the use of a specific liquid crystal material. While Saito et al does not specify any specific liquid crystal material

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by stating, at col. 7, lines 5-6, "injecting a liquid crystal material from the opening, while setting the atmosphere at a negative pressure ...". Saito discloses at col. 18, lines 66+, "each of the electronic equipment with the liquid crystal display device built therein is capable of offering enhanced display ability of high quality images with visual irregularities greatly suppressed or eliminated because of the fact that its liquid crystal panel cell gap has less variation". Since **Saito et al does not express any desire of a specific type or an improved liquid crystal material for use in his liquid crystal display device, there can be no motivation to combine the teachings of Lu et al with Saito et al**, and thus placing the multi-domain homeotropically aligned liquid crystal cells in the Saito et al's liquid crystal display device.

The Appellants respectfully submit that although the Examiner suggests that the Saito et al reference could readily be modified to include the Lu et al's reference, "the mere fact that the prior art could be so modified and would not have made the modification obvious **unless the prior art suggested the desirability of the modification**". In re Gordon, 733 F2d 900, 902, 221 USPQ 1125, 1127 (Fed.Cir. 1984). The Appellants respectfully

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submit that Saito et al does not suggest Lu et al's modification or provide any reason or motivation to make the modification.

The rejection of claims 1, 3, 10, 12, 14 and 16 under 35 USC §103(a) based on Saito et al and Lu et al is improper and must be reversed.

#### Issue II

Claims 4 and 17 are rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Kim et al '794. It is contended that Kim et al teaches a liquid crystal comprising a multiplicity of elongated recesses 43 formed in a metal layer on the top surface of the lower substrate for forming a fringe field homeotropically aligned liquid crystal cell.

Claim 4 depends on independent claim 1, while claim 17 depends on independent claim 14. The Appellants have clearly shown that the newly amended independent claims 1 and 14 recite the additional limitation of "a multiplicity of multi-domain homeotropically aligned liquid crystal cells", which is not taught or disclosed by either Saito et al or Kim et al.

The rejection of claims 4 and 17 under 35 USC §103(a) based on Saito et al and Kim et al is improper and must be reversed.

### **Issue III**

Claim 5 is rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Iwaki et al '432. It is contended that Iwaki et al teaches a liquid crystal with each of the liquid crystal cells having a square configuration with a dimension of each side about 20  $\mu\text{m}$ , or in a range between about 5  $\mu\text{m}$  and about 20  $\mu\text{m}$  for high speed.

The rejection of claim 5 under 35 USC §103(a) based on Saito et al and Iwaki et al is improper and must be reversed.

Claim 5 has been amended to depend on the newly amended independent claim 1, which further recites the limitation of a multiplicity of multi-domain homeotropically aligned liquid crystal cells. The Appellants respectfully submit that such is not disclosed or taught by either Saito et al, Iwaki et al, either singularly or in combination thereof.

The rejection of claim 5 under 35 USC §103(a) based on Saito et al and Iwaki et al is improper and must be reversed.

#### **Issue IV**

Claim 6 is rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Bischel et al '268. It is contended that Bischel et al teaches a display panel with each of the liquid crystal cells having a square configuration with a distance to an immediately adjacent pixel less than 100  $\mu\text{m}$ .

The rejection of claim 6 under 35 USC §103(a) based on Saito et al, Lu et al and Bischel et al is improper and must be reversed.

Claim 6 depends on independent claim 1, which has been amended to further recite the limitation of multi-domain homeotropically aligned liquid crystal cells which is not taught or disclosed by Saito et al, Lu et al, Bischel et al, either singularly or in combination thereof.



The rejection of claim 6 under 35 USC §103(a) based on Saito et al, Lu et al and Bischel et al is improper and must be reversed.

#### **Issue V**

Claim 7 is rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Rosenblatt et al '358. It is contended that Rosenblatt et al teaches a liquid crystal material that fills the sealed cavity being a chiral-type liquid crystal for promoting homeotropic alignment of the liquid crystal and exhibiting a uniform homeotropic alignment substantially throughout the cell.

The rejection of claim 7 under 35 USC §103(a) based on Saito et al, Lu et al and Rosenblatt et al is improper and must be reversed.

While the Appellants do not dispute the fact that Rosenblatt et al teaches a liquid crystal material that is a chiral-type liquid crystal, the Appellants respectfully submit that Rosenblatt et al does not teach a multi-domain homeotropically aligned liquid crystal cell.

Claim 7 depends on the newly amended independent claim 1, which recites a multiplicity of multi-domain homeotropically aligned liquid crystal cell, which is neither taught or disclosed by Saito et al, Lu et al and Rosenblatt et al, even when combined together.

The rejection of claim 7 under 35 USC §103(a) based on Saito et al, Lu et al and Rosenblatt et al is improper and must be reversed.

#### **Issue VI**

Claims 8 and 18 are rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Akimoto et al JP '522. It is contended that Akimoto teaches spacers being formed of silicon oxide for obtaining the tilted apparatus having an excellent display quality.

Claim 8 depends on the newly amended independent claim 1, while claim 18 depends on the newly amended independent claim 14. Both claims 1 and 14 recites a liquid crystal material that is a multiplicity of multi-domain homeotropically aligned liquid crystal

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cell, which is neither taught or disclosed by Saito et al, Lu et al, Akimoto et al, either singularly or in combination thereof.

The rejection of claims 8 and 18 under 35 USC §103(a) based on Saito et al and Akimoto et al is improper and must be reversed.

#### **Issue VII**

Claims 9, 11 and 19-20 are rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 and Lu et al '786. It is contended that while Saito et al fails to disclose a reflective metal layer formed by a metal selected from the group consisting of Al, Ag and Al-Nd, the Examiner contended that it is well known in the art that reflective metal layers are made of aluminum for low cost and easy manufacturing.

The rejection of claims 9, 11 and 19-20 under 35 USC §103(a) based on Saito et al and Lu et al is improper and must be reversed.

Claims 9 and 11 depend on independent claim 1, while claims 19-20 depend on independent claim 14. The Appellants have

clearly shown that the newly amended independent claims 1 and 14 are not rendered obvious by Saito et al and Lu et al, since Saito et al and Lu et al do not teach or disclose a multiplicity of multi-domain homeotropically aligned liquid crystal cells.

The rejection of claims 9, 11 and 19-20 under 35 USC §103(a) based on Saito et al and Lu et al is improper and must be reversed.

#### **Issue VIII**

Claim 13 is rejected under 35 USC §103(a) as being unpatentable over Saito et al '308 in view of Lu et al '786 and Nishio et al et al '547. It is contended that Nishio et al teaches a liquid crystal display with each of said third multiplicity of silicon light valves having a height between about 0.3  $\mu\text{m}$  and about 3  $\mu\text{m}$  for eliminating irregularities caused by the TFT and treatment of flattening.

The rejection of claim 13 under 35 USC §103(a) based on Saito et al, Lu et al and Nishio et al is improper and must be reversed.

Claim 13 depends on the newly amended independent claim 1, which now further recites the limitation of a multiplicity of multi-domain homeotropically aligned liquid crystal cells. The Appellants respectfully submit that neither Saito et al, Lu et al or Nishio et al teach or disclose such limitation, either singularly or in combination thereof.

The rejection of claim 13 under 35 USC §103(a) based on Saito et al and Nishio et al is improper and must be reversed.

In the Response to Arguments section of the 01/15/2004 Office Action, the Examiner stated "besides, Saito also disclose **any domains** that can occur at such part are invisible, which in turn ensures that the display characteristics are free from any possible degradation (col. 15, lines 63-65). Thus, Saito **implies** the multi-domains can be used for increasing display characteristics."

The Appellants respectfully traverse such arguments as showing any desirability for combining Lu et al with Saito et al. The mere fact that Saito stated "any domains that can occur at such part are invisible" cannot be equated to a statement of showing the

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desirability of using a specific domain, i.e. the multi-domain homeotropically aligned liquid crystal cells, as in the present invention. As a matter of fact, the statement of "any domains" of Saito et al **teaches away from the present invention.**

CLOSING

In summary, the Appellants have shown that their claimed invention is fully supported by a body of evidence of non-obviousness. It is therefore respectfully submitted that such evidence of non-obviousness overcomes any showing of obviousness presented by the Examiner. The Appellants therefore submit that the final rejection of their claims 1, 3-14 and 16-20 is improper under 35 USC §103(a).

The reversal of the final rejection is respectfully solicited from the Board.

Respectfully submitted,

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RWT\kd

**CLAIM APPENDIX**

1. (previously presented) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves comprising:

a silicon substrate having a first multiplicity of pixel electrodes formed on a top surface;

a second multiplicity of integrated spacers formed of an insulating material on said top surface of the silicon substrate in-between said first multiplicity of pixel electrodes;

a third multiplicity of silicon light valves formed on said top surface of the silicon substrate for orienting liquid crystal molecules;

a glass substrate that is optically transparent having an optically transparent electrode layer coated on a bottom surface positioned juxtaposed to and over said silicon substrate supported by said second multiplicity of integrated spacers forming a sealed cavity by engaging a perimeter seal surrounding said two substrates, said sealed cavity encases said optically transparent electrode layer and said third multiplicity of silicon light valves therein; and

a liquid crystal material comprising a multiplicity of multi-domain homeotropically aligned liquid crystal cell filling said sealed cavity.

2. (cancelled)

3. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1 further comprising a multiplicity of lines formed of insulating material protruding from said top surface of the silicon substrate for forming a multi-domain homeotropically aligned liquid crystal cell.

4. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1 further comprising a multiplicity of elongated recesses formed in a metal layer on said top surface of the silicon substrate for forming a fringe field homeotropically aligned liquid crystal cell.



5. (previously presented) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein each of said liquid crystal cell having a square configuration with a dimension of each side between about 5  $\mu\text{m}$  and about 20  $\mu\text{m}$ .

6. (previously presented) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein each of said liquid crystal cell having a square configuration with a distance to an immediate adjacent pixel at between about 0.3  $\mu\text{m}$  and about 2  $\mu\text{m}$ .

7. (previously presented) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein the liquid crystal material that fills said sealed cavity being a chiral-type liquid crystal.

8. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein said second multiplicity of integrated spacers being formed of silicon oxide, silicon nitride or silicon oxynitride.

9. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 4, wherein said metal layer is formed by a metal selected from the group consisting of Al, Ag and Al-Nd.

10. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein each of said third multiplicity of silicon light valves being formed of a polysilicon tip and a dielectric material base.

11. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein said top surface of the silicon substrate being covered by a layer of metallic reflective film.

12. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein each of said second multiplicity of integrated spacers having a height between about 0.5  $\mu\text{m}$  and about 10  $\mu\text{m}$ .

13. (original) A liquid crystal on silicon structure incorporating integrated spacers and silicon light valves according to claim 1, wherein each of said third multiplicity of silicon light valves having a height between about 0.3  $\mu\text{m}$  and about 3  $\mu\text{m}$ .

14. (previously presented) A method for fabricating a liquid crystal on silicon structure with built-in integrated spacers and silicon light valves comprising the steps of:

providing a silicon substrate having a top surface;

forming a first multiplicity of pixel electrodes on said top surface;

forming a second multiplicity of integrated spacers from an insulating material on said top surface of the silicon substrate in-between the first multiplicity of pixel electrodes;

forming a third multiplicity of silicon light valves on said top surface of the silicon substrate for orienting liquid crystal molecules;

providing a glass substrate that is optically transparent and coating an optically transparent electrode layer on a bottom surface of the glass substrate;

positioning the glass substrate juxtaposed to and over said silicon substrate supported by said second multiplicity of integrated spacers and sealing a perimeter of the two substrates to form a sealed cavity therein between; and

filling the sealed cavity through an inlet a liquid crystal material and forming a multiplicity of multi-domain homeotropically aligned liquid crystal cell in-between said second multiplicity of integrated spacers.

15. (cancelled)

16. (original) A method for fabricating a liquid crystal on silicon structure with built-in integrated spacers and silicon light valves according to claim 14 further comprising the step of forming a multiplicity of protruded lines from an insulating material on said top surface of the silicon substrate for forming a multi-domain homeotropically aligned liquid crystal cell.

17. (original) A method for fabricating a liquid crystal on silicon with built-in integrated spacers and silicon light valves according to claim 14 further comprising the step of forming a multiplicity of elongated recesses in a metal layer on the top surface of the silicon substrate and forming a fringe field homeotropically aligned liquid crystal cell.

18. (original) A method for fabricating a liquid crystal on silicon with built-in integrated spacers and silicon light valves according to claim 14 further comprising the step of forming said second multiplicity of integrated spacers by a material selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride.

19. (original) A method for fabricating a liquid crystal on silicon with built-in integrated spacers and silicon light valves according to claim 17 further comprising the step of depositing said metal layer from a material selected from the group consisting of Al, Ag and Al-Nd.

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20. (original) A method for fabricating a liquid crystal on silicon structure with built-in integrated spacers and silicon light valves according to claim 14 further comprising the step of depositing a metal layer on top of the silicon substrate as a reflective coating layer.